REMARKS

The foregoing amendment amends the claims so as to more clearly define the claimed subject matter. The only substantive change made is the nature of an explanation whereby claim 1 now states that the airborne respirable particles or droplets, which otherwise would enter the lungs of a human or animal, deposit instead in the vicinity of the mouth, nose or upper respiratory tract. Support for this change is in the written description at page 3, lines 6-18. These amendments are not intended to limit the scope of the changed subject matter.

The dependency of claim 5 has been changed.

Rejection Over PCT Publication WO 97/28883

The Examiner has rejected claims 1-7, 15 and 16 as obvious over WO 97/28883.

> WO teaches a method of precipitating airborne particles by contacting airborne particles with liquid droplets and imparting a charge of +/- .0001 C/Kg using an aerosol device (abstract). The particles treated are within instant range (pg. 9, line 13) and the droplets are in the range of 5-100 microns (claims 5). The liquid composition is a water/hydrocarbon emulsion (pg. 4, lines 1-5). WO teaches the properties of the actuator, the diameter of the dip tube, and the characteristics of the valve impart the desired charge on the liquid droplets (pg. 4).
>
> Although, WO does not specify that the invention is for the method of reducing inhalation of airborne particles, it is deemed obvious to one of ordinary skill in the art at the time the invention was made that removing particulates in the air reduces the change of inhaling the particulates, thereby reducing the inhalation of airborne particles.

The WO '883 reference is quite familiar to Applicants since the inventorship in the instant application is identical. The reference is concerned with precipitation from the air of airborne particles by means of contacting the particles with electrostatically charged liquid droplets. The unipolar charge on the liquid droplets transfers to the airborne particles and the airborne particles are caused to precipitate due to mutual repulsion. In contrast, the claims of the instant application do not involve the

precipitation of any airborne particles. Rather, this invention is directed simply to a way to reduce inhalation of particles coming out of an aerosol spray device. Applicants' method involves imparting an electrostatic charge to the liquid particles during the spraying of droplets so that the liquid particles land in the vicinity of the nose, mouth or upper respiratory tract (of a human or animal), rather than entering the lungs. This is further explained in Applicants' written description in the paragraph beginning at page 3, line 6.

Applicants' claimed methods are applicable for use in connection with most aerosol spray devices in current use, examples of which are set forth on page 3, lines 25-31. In accordance with Applicants' method, the charged droplets will disperse as a result of mutual repulsion and they will preferentially move towards surfaces having an opposite or neutral charge, such as the face, nose, or upper respiratory tract and they will deposit on said surfaces. As a result of the particles being deposited on these surfaces, they will not enter the lungs of a human or animal. The claims have now been amended to more fully explain the mechanism involved in Applicants' methods. In contrast, there is nothing in WO '883 about reducing the inhalation of droplets from an aerosol spray. According to Applicants' claimed methods, the electrostatically charging of the droplets results in those droplets that do not encounter airborne particles being less harmful to humans or animals in an enclosed space.

The foregoing discussion relates to claim 1, but the rejection also covers claims 2-7, 15 and 16. Claims 2, 3 and 4 cover methods according to claim 1 where the amounts of airborne respirable particles capable of entering the lungs are reduced by 25%, 40% and 75%, respectively. The arguments presented as to claim 1 apply equally to claims 2, 3 and 4.

Claim 5 is directed to a method of claim 1 in which the spray device is an aerosol spray device. Claim 6 contains the further limitation that the spray device must include an emulsion. Claims 7, 15 and 16 are concerned with characteristics of the droplets

which are sprayed out from the emulsion. The additional limitations in these claims are not at the point of novelty of Applicants' invention. Accordingly, since claim 1, on which all of these claims directly or ultimately depend, is patentable over the cited reference, likewise, claims 5-7, 15 and 16 are patentable.

Rejection Over PCT Publication WO 97/28883 in view of Grawe – U.S. Pat. No. 5,421,897

The Examiner has rejected claims 8, 9 and 13 as obvious over WO 97/28883 in view of Grawe U.S. Patent No. 5,412,897.

> As set forth above, WO teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device.
>
> WO does not specify the use of a surfactant or a propellant.
>
> Grawe teaches the process of the abatement of contaminants. Grawe teaches the toxicity of airborne particles and the application of a liquid composition to encapsulate the particles for physical removal (col. 6, lines 44-50). The method may be applied via an aerosol spray (col. 6, lines 62). The composition may contain surfactants to stabilize the composition from phase separation and lower surface tension (col. 16, lines 32-35). Grawe teaches the inclusion of hydrocarbons for an aerosol device (col. 17, lines 15-26).
>
> It would have been obvious to one or ordinary skill in the art at the time the invention was made to add a surfactant to WO's emulsion composition since Grawe teaches the use of surfactants to stabilize emulsions from phase separation. Further, Grawe teaches the use of hydrocarbons (butane or propane) for aerosol devices.

The primary reference is WO '883 which, according to the Examiner, teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device. As pointed out above in connection with the rejection of claim 1, WO '883 does not teach a method of precipitating airborne particles and therefore this reference is not an indication of obviousness.

The primary reference does not disclose surfactants or propellants which are among the further limitations claimed in claims 8, 9 and 13. The Grawe patent is used as a secondary reference to supply what is not disclosed in WO '883. However, the

presence of surfactants and/or a propellant is not at the point of novelty in Applicants' invention. Accordingly, since claim 1, upon which claims 8, 9 and 13 are ultimately dependent, is patentable over WO'883, likewise claims 8, 9 and 13 are patentable.

The Examiner observes, correctly, that the Grawe reference teaches a process for abatement of contaminants. Applicants' claims are not directed to abatement or combating contaminants and therefore the secondary reference is actually of little or no relevance.

Rejection Over PCT Publication No. WO 97/2883 and Kulkarni – U.S. Patent No. 5,191,149

The Examiner has rejected claims 8-10, 13 and 14 as obvious over WO 97/28883 in view of Kulkarni U.S. Patent No. 5,191,149.

> As set forth above, WO teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device.
>
> WO does not specify the use of a surfactant or a propellant.
>
> Kulkarni teaches the state of the art concerning aerosols. The reference teaches the use of pressurized gas or LPGs to spray liquids, which take the form of a mist of small liquid droplets. Aerosols may be used for numerous products such as cleaners, air fresheners, etc. Kulkarni teaches that aerosols contains surface-active agents, stabilizers, solvents, and may contain as much as 90% propellants. (col. 1, lines 5-30).
>
> It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings WO and Kulkarni since Kulkarni teaches the state of art of aerosols and teaches that aerosol forms usually contain surfactants and propellants to function.

The primary reference is WO '883 which, according to the Examiner, teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device. As pointed out above in connection with the rejection of claim 1, WO '883 does not teach a method of precipitating airborne particles and therefore the reference is not an indication of obviousness.

The primary reference does not disclose surfactants and repellants, which are among the further limitations claimed in claims 8-10, 13 and 14. The Kulkarni reference is used as a secondary reference to supply what is not disclosed in WO '883. However, the presence of surfactants and/or propellants is not at the point of novelty in Applicants' invention. Accordingly, since claim 1, on which claims 8-10, 13 and 14 all ultimately depend, is patentable over WO '883, likewise, claims 8-10, 13 and 14 are patentable.

Rejection Over PCT Publication WO 97/2883, Kulkarni U.S. Patent No. 5,191,149 and Kalat U.S. Patent No. 4,110,427

The Examiner has rejected claims 11 and 12 as obvious over WO 97/28883 in view of Kulkarni U.S. Patent No. 5,191,149 and further in view of Kalat U.S. Patent No. 4,110,427.

> As set forth above, WO teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device. Kulkarni teaches the art of aerosols.
>
> The references do not teach instant surfactants.
>
> Kalat teaches a water-based composition containing a powder and a hydrophobic phase (propellant). Kalat teaches polyglycerol oleate produces a strong water-in-propellant emulsion and is a good corrosion inhibitor if the composition is packaged in a metal container (col. 5, lines 15-21 and examples).
>
> It would have been obvious to one of ordinary skill in the art at the time the invention was made to use polyglycerol oleate in WO's composition since Kalat teaches a water-based composition and teaches polyglycerol oleate produces a strong water-in-propellant emulsion which would be suitable since WO is a water- propellant based composition.

The primary reference again is WO '883 which, according to the Examiner, teaches a method of precipitating airborne particles using an emulsion composition in an aerosol device. As pointed out above in connection with the rejection of claim 1, WO '883 does not teach a method of precipitating airborne particles and therefore the reference is not an indication of obviousness. The Kulkarni patent is used as a secondary reference for its teachings on aerosols and the Examiner is correct in his statement that Kulkarni teaches the art of aerosols. However, as pointed out above in connection with

the rejection of claim 8 (and others) over WO '883 in view of Kulkarni, the use of aerosols in Applicants' claimed methods is not at the point of novelty in Applicants' invention.

The primary reference and the Kulkarni reference do not disclose the surfactants claimed in claims 11 and 12 and the Kalat patent is used as a secondary reference to supply what is not disclosed in WO '883 or Kulkarni. However, the particular surfactants to be used in connection with Applicants' claimed methods are also not at the point of novelty of Applicants' invention. Accordingly, since claim 1, on which claims 11 and 12 ultimately depend, and claim 8, on which claims 11 and 12 directly or ultimately depend, are patentable over the WO '883 and Kulkarni taken in combination, likewise claims 11 and 12 are patentable.

Rejection Over Malcolm U.S. Patent No. 4,541,844

The Examiner has rejected claims 1-4 as obvious over Malcolm U.S. Patent No. 4,541,844.

> Malcolm teaches a method of electrostatic particle collection by spraying liquid droplets of 60 microns or less with an electrical charge of .01 coulombs per kilogram (col. 2, lines 40-45 and claim 1). The method removes particulates between .1 and 20 microns (col. 3, lines 4-6).
>
> Malcolm does not specify the amount of particles that do not enter the respiratory system.
>
> Although, Malcolm does not specify that the invention is for the methods of reducing inhalation of airborne particles, it is deemed obvious to one of ordinary skill in the art at the time the invention was made that by removing particulates in the air, reduces the chance of inhaling the particulates, thereby reducing the inhalation of airborne particles.
>
> In the absence of showing otherwise and since Malcolm teaches all the limitations of claim 1, it is the position of the examiner that volume of particulates that do not enter the respiratory tract of the prior art corresponds to the instantly recited volumes.

This reference describes a method of agglomerating particles by electrostatic attraction, thus facilitating their removal from an air stream. Cyclonic removal will be

enhanced due to the effective increase in particle size. Electrostatic removal will be enhanced if the charged agglomerates are subjected to an electric field. In particular, Malcolm '844 teaches electrostatically charging a water aerosol by induction, a process requiring the use of a high DC voltage, e.g. 20 to 100 kilovolts (see column 3, line 39). The charged water aerosol is used primarily to attract smaller airborne particles of less than 20 microns in diameter, thus inducing agglomeration. This in turn leads to improved removal by cyclonic action (see column 2, lines 46-56). Malcolm thus relies specifically on dielectrophoretic processes to enhance particle collection and this is bourn out in the title.

In contrast, Applicants' invention is concerned with reducing the inhalation of airborne respirable particles or droplets having a diameter of less than 10 micrometers by imparting a unipolar charge to the droplets, whereby these droplets deposit in the vicinity of the mouth, nose or upper respiratory tract, and do not enter the lungs. The charging system used in the present invention is a passive charging system and there is no requirement for any agglomeration of the particles to occur. Because the small particles or droplets are charged, they "plate out" onto the mouth, nose or upper respiratory tract, and lose their charge. For a more detailed discussion of the mode of action of the present invention, please see page 3, lines 6-22.

Inasmuch as the purpose of Applicants' invention and the mode of carrying out the invention have nothing in common with what is disclosed in Malcolm '844, it is submitted that claims 1-4 would not have been obvious over said reference.

Rejection Over Malcolm U.S. Pat. No. 4,541,844 and Inculet U.S. Pat. No. 5,400,975

The Examiner has rejected claim 5 as obvious Malcolm U.S. Patent No. 4,541,844 in view of Inculet U.S. Patent No. 5,400,975.

> Malcolm teaches a method of electrostatic particle collection by spraying liquid droplets of 60 microns or less with an electrical charge of 0.1 coulombs per kilogram (col. 2, lines 40-45 and claim 1). The method removes particulates between .1 and 20

microns (col. 3, lines 4-6). Malcolm teaches a spray tower to apply the liquid droplets (col. 3, lines 10-50).

Malcolm does not teach using an aerosol device to apply the liquid composition.

Inculet et al teach an actuator for electrostatically charging an aerosol spray. Inculet teaches that it is known in the art that the application of an aerosol spray may be enhanced by electrostatically charging the spray as it is dispensed from the nozzle. The spray acquires a charge and is attracted to another oppositely charged body (col. 1, lines 5-33). Further, the reference teaches aerosol dispensers are portable, self-contained, and economical (col. 2, lines 27-30).

It would have been obvious to one or ordinary skill in the art at the time the invention was made to use an aerosol device with an actuator to dispense Malcolm's liquid droplet. One would be motivated to do so since Inculet teaches aerosol devices are portable and economical and the actuator dispenses an electrostatic charge, which is needed for Malcolm's droplets to collect particulates.

The Examiner states – quite correctly – that the Malcolm reference teaches a method of electrostatic particle collection by spraying liquid droplets of 60 microns or less with an electrical charge of .01 coulombs per kilogram, that the method removes particulates between 0.1 and 20 microns, and that it teaches a spray tower to apply liquid droplets. However, this is all irrelevant because, as pointed out in connection with the rejection of claims 1-4 over the Malcolm reference alone, the reference is not concerned with reducing inhalation of airborne respirable particles. Furthermore, as pointed out, the instant invention involves a passive charging system and there is no agglomeration of particles, as would be required by the Malcolm reference. Therefore, Malcolm '844 cannot be considered a indication of obviousness.

The primary reference does not teach the use of an aerosol spray device, which is the limitation claimed in claim 5. The Inculet reference is used as a secondary reference to supply what is not disclosed in Malcolm '844. However, the use of, specifically, an aerosol spray device is not at the point of novelty of Applicants' invention. Accordingly, since claim 1, on which claim 5 depends, is patentable over Malcolm '844, likewise claim 5 is patentable.

The Examiner has rejected claims 6-10 and 13-16 as obvious over Malcolm U.S. Patent No. 4,541,844 in view of Inculet U.S. Patent No. 5,400,975 further in view of Kulkarni U.S. Patent No. 5,191,149

Rejection Over Malcolm U.S. Patent No. 4,541,844, Inculet U.S. Patent No. 5,400,975 and Kulkarni U.S. Patent No. 5,191,149

> As set forth above, Malcolm teaches a method of particle collection by spraying liquid droplets of 60 microns or less and an electrical charge of .01 coulombs per kilogram (col. 2, lines 40-45 and claim 1). The method removes particulates between .1 and 20 microns (col. 3, lines 4-6). Inculet teaches the use of aerosol dispensers to electrostatically charge the liquid dispensed.
>
> The references do not teach the hydrocarbons and surfactants in the liquid composition.
>
> Kulkarni teaches the state of the art concerning aerosols. The reference teaches the use of pressurized gas of LPGs to spray liquids, which take the form of a mist of small liquid droplets. Aerosols may be used for numerous products such as cleaners, air fresheners, etc. Kulkarni teaches that aerosols contains surface-active agents, stabilizer's solvents, and may contain as much as 90% propellants. (col. 1, lines 5-30).
>
> It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings Malcolm, Inculet, and Kulkarni since Kulkarni teaches the state of art of aerosols and teaches that aerosol forms usually contain surfactants and propellants to function.

The Examiner states, correctly, that Malcolm teaches a method of particle collection by spraying liquid droplets of 60 microns or less and an electrical charge of .01 coulombs per kilogram, and that the method removes particulates between 1 and 20 microns. However, this is irrelevant because, as pointed out in connection with the rejection of claims 1-4 over the Malcolm reference alone, the reference is not concerned with methods for reducing inhalation of airborne respirable particles. Furthermore, as pointed out, the instant invention involves a passive charging system and there is not agglomeration of particles as required by Malcolm.

The primary reference does not disclose hydrocarbons and surfactants in the liquid compositions, which are among the further limitations disclosed in claims 8-10 and 13-

16. It also does not teach compositions that are emulsions, as required in all of claims 6-10 and 13-16. The Inculet reference is used also for its teachings concerning aerosols and for the use of pressurized gases to spray liquids. These particular features are not at the point of novelty of Applicant's invention. Accordingly, since claim 1, on which all of claims 6-10 and 13-16 ultimately depend, is patentable over Malcolm '844, likewise claims 6-10 and 13-16 are patentable.

Conclusion

In view of the foregoing amendment and these remarks, it is submitted that all claims in this application are in condition for allowance. Favorable action is requested.

Respectfully submitted,

Date: 12/23/2002

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Version with markings to show changes made

In the claims:

Claims 1-5 have been amended as follows:

1. (Amended) A method of reducing the inhalation of [airborne/respirable] airborne respirable particles or droplets having a diameter of less than 10 micrometres[,] that are produced by spraying liquid droplets from a spray device, which method [comprising] comprises imparting a unipolar charge to the liquid droplets by double layer charging during the spraying of the droplets from [a] said spray device, the unipolar charge being at a level such that the droplets have a charge to mass ratio of at least + 1 x 10-4 C/kg, whereby at least 10% by volume of the airborne respirable particles or droplets having a diameter of less than 10 micrometres, which otherwise would enter the lungs of a human or animal, deposit in the vicinity of the [mouith] mouth, nose or upper respiratory tract and do not enter the lungs.

2. (Amended) A method as claimed in claim 1 wherein at least 25% by volume of the airborne respirable particles or droplets having a diameter of less than 10 micrometres [in the vicinity of the mouth, nose or upper respiratory tract] do not enter the lungs.

3. (Amended) A method as claimed in claim [1] 2 wherein at least 40% by volume of the airborne respirable particles or droplets having a diameter of less than 10 micrometres [in the vicinity of the mouth, nose or upper respiratory tract] do not enter the lungs.

4. (Amended) A method as claimed in claim [1] 3 wherein at least 75% by volume of the airborne respirable particles or droplets having a diameter of less than 10 micrometres [in the vicinity of the mouth, nose or upper respiratory tract] do not enter the lungs.

5. (Twice Amended) A method as claimed in claim [4] 1 in which the spray device is an aerosol spray device.